wherein said gas supply structure group includes a light emitting portion for generating a laser beam, and the flow speed of said laser gas at said light emitting portion is higher than a speed of sound, and

B2 cont.

wherein the laser oscillating apparatus is an excimer laser oscillating apparatus.

REMARKS

The claims are 17-19 and 20-40, with claims 17 and 30 being independent. Claims 1-12 have been canceled without prejudice to or disclaimer of subject matter contained therein. Claims 17 and 30 have been amended to more clearly define the present invention. Support for this amendment may be found throughout the specification, for instance in the First Embodiment. No new matter has been added. Reconsideration of the present claims is expressly requested.

Claims 1-12, 17-19, 21-25, 28 and 29 stand rejected under 35 U.S.C. 103(a) as being allegedly unpatentable over U.S. Patent No. 6,198,762 (Krasnov) in view of U.S. Patent No. 5,781,579 (Choo).

Claim 20 stands rejected under 35 U.S.C. 103(a) as being allegedly unpatentable over Krasnov in view of Choo and further in view of U.S. Patent No. 6,212,211 (Azzola).

Claims 26 and 27 stand rejected under 35 U.S.C. 103(a) as being allegedly unpatentable over Krasnov in view of Choo and further in view of U.S. Patent No. 4,317,087 (Sander).

Claims 30, 31, 33-36, 39 and 40 stand rejected under 35 U.S.C. 103(a) as being allegedly unpatentable over Krasnov in view of Choo and U.S. Patent No. 4,911,805 (Ando).

Claim 32 stands rejected under 35 U.S.C. 103(a) as being allegedly unpatentable over Krasnov in view of Choo and Ando and further in view of Azzola.

Claim 37 and 38 are rejected under 35 U.S.C. 103(a) as being unpatentable over Krasnov in view of Choo, Ando and Azzola and further in view of Sander.

Applicants respectfully traverse the grounds of rejection.

Prior to addressing the merits of rejection, Applicants would like to briefly discuss come of the key features and advantages of the presently claimed invention. The present invention is directed to an excimer laser oscillating apparatus capable of oscillating light within the ultraviolet region. Specifically, this invention addresses a situation in which a conventional excimer laser oscillating apparatus provides only a very short periodic pulse. In addition, the invention provides the apparatus that is capable of continuously oscillating light with a relatively long oscillation period.

A conventional laser oscillating apparatus provides a short periodic pulse light because:

(a) if plasma used as a light-emitting source is generated using DC current or low frequency alternating current, the discharge state changes from a glow to an arc and plasma generation required for the light emission is stopped immediately after plasma is generated; and

(b) if plasma is generated once, molecular species, for example fluorine gas, needed for plasma generation disappear and plasma cannot be generated until the species are reintroduced.

To deal with these issues and to provide a continuously oscillating excimer laser, the present invention includes the following features:

1) to address (a) above, a microwave is used for generating plasma to restrain the arc discharge after plasma is generated; and

2) to address (b) above, the gas used to generate plasma is exhausted at high speed to prevent the disappearance of the molecular species necessary for plasma generation.

In addition, with respect to the above feature 2), to prevent the shock wave that is generated when the gas flow speed exceeds the speed of sound, the present inventive apparatus includes a portion that keeps the flow speed below the speed of sound (see claim 17).

Krasnov is directed to supersonic and subsonic lasers that have a gaseous active medium, a nozzle, an RF discharge region, a laser active region, an optical resonator and a diffuser in order to produce a small, lightweight and closed gas system. This reference discloses a technique for supplying gas at high speed to generate plasma. However, Krasnov does not disclose or suggest that this technique is applicable to excimer lasers in which gas for plasma generation is continuously supplied. This reference shows no recognition of the above points (a) and (b) or that features 1) and 2) would address them. It is thus respectfully submitted that a person skilled in the art would not look to

Krasnov for disclosure regarding an excimer laser. Clearly, Krasnov cannot be applied as a reference against the presently claimed excimer laser oscillating apparatus.

None of the secondary references remedy the problems of Krasnov. Choo is directed to a microwave excited gas laser. However, this reference is not related to excimer lasers and it fails to teach or suggest that either its disclosure or the disclosure in Krasnov is applicable to an excimer laser oscillating apparatus.

Azzola is directed to pulsed systems. The Examiner cited this reference merely to show that laser gas can be an excimer laser gas such as a mixture of krypton and fluorine. This disclosure, however, does not suggest that the teachings in either Krasnov or Choo are applicable to an excimer laser oscillating apparatus.

Sander is directed to the XeBr laser. However, like Krasnov and Choo, Sander is not related to excimer lasers. Like Azzola, this reference fails to suggest that the teachings in either Krasnov or Choo are applicable to an excimer laser oscillating apparatus.

Ando is directed to a method for adjusting the flow speed of fine particles. However, this reference is not related to an excimer laser oscillating apparatus of the present invention and cannot suggest that the teachings in either Krasnov or Choo are applicable to an excimer laser oscillating apparatus.

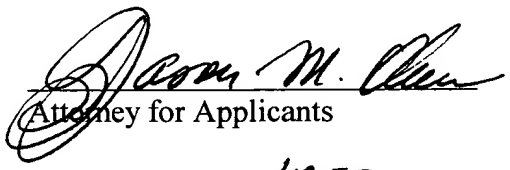
In sum, Applicants respectfully submit that none of the references, whether considered separately or in any combination, discloses or suggests the combination of elements now claimed. In particular, none of the references teaches that the presently claimed structure can be a part of the excimer laser oscillating apparatus. A prima facie case of obviousness, therefore, cannot prevail.

This Amendment After Final Rejection should be entered because it places the case in allowable form. Alternatively, it places the case in better form for possible appeal.

Wherefore, in view of the foregoing amendments and remarks, Applicants respectfully request that all rejections be withdrawn and the subject application be passed to issue.

Applicants' undersigned attorney may be reached in our New York office by telephone at (212) 218-2100. All correspondence should continue to be directed to our below listed address.

Respectfully submitted,



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APPENDIX

Application No. 09/425,015
Attorney Docket No. 03500.013974

IN THE CLAIMS:

Claims 17 and 30 have been amended as follows:

17. (Twice Amended) A laser oscillating apparatus comprising:

a gas supply path structure of a convergent-divergent nozzle type, including a fluid inlet into which a laser gas is made to flow, a throat portion for controlling a flow speed of said laser gas less than a speed of sound, and a fluid outlet of which said laser gas from said throat portion is made to flow out; and

a waveguide unit for guiding microwave into said gas supply path structure,

wherein the laser oscillating apparatus is an excimer laser oscillating apparatus.

30. (Twice Amended) A laser oscillating apparatus comprising: a gas supply structure group including a plurality of connected convergent-divergent nozzles, said nozzle each comprising a fluid inlet into which a laser gas is made to flow, a throat portion for controlling a flow speed of said laser gas, and a fluid outlet of which said laser gas from said throat portion is made to flow out; and

a waveguide unit for guiding microwave into said gas supply path structure group,

wherein said gas supply structure group includes a light emitting portion for generating a laser beam, and the flow speed of said laser gas at said light emitting portion is higher than a speed of sound, and

wherein the laser oscillating apparatus is an excimer laser oscillating apparatus.